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Field of the invention

This invention relates to a linear self-enclosed apparatus for compressing freshly dug soil into compressed blocks suitable for the creation of a structure.

Background of the Invention

The formation of building blocks from soil and clay is a well known process utilized throughout the world. Throughout the years various applications designed to automate this process have been produced. Previously designed apparatus, however, have involved complex mechanical procedures. A need exists for a design and process in which building blocks of different sizes and thickness can be formed simultaneously. An additional need exists for a design which allows for two or more systems to be joined and operated simultaneously or independently, while maintaining an easy access to replaceable components.

Examples of previous known form of presses similar to the present invention are disclosed in U.S. Pat. Nos. 4,640,671; 6,224,359.

Summary of the Invention

The main objective of this invention is to provide a new and improved **linear building block forming apparatus** which is self-contained and capable of receiving a quantity of soil, forming building blocks of adjustable dimensions uniformly, and ejecting said blocks within a single multiple function case.

It is also an object of the invention to provide a new and improved **linear building block forming process** that is linear and contained within a multiple purpose case.

It is also an object of the invention to provide a new and improved **linear building block forming process** in which opposing compression heads are moved toward and away from one another with the purpose of receiving an adjustable quantity of soil, moving said soil, compressing said soil into a block and ejecting a compressed soil block.

It is also an object of the invention to provide a new and improved **linear building block forming process** in which opposing compression heads are moved toward and away from one another by any mechanical means.

It is therefore an object of the invention to provide a new and improved **linear building block forming apparatus** that may be mounted on a trailer chassis and may be towed to the site of construction.

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It is another object of the invention to provide a new and improved **linear building block forming apparatus** that will create building blocks of different plan sizes utilizing a heavy textured clay, preferably without any addition of moisture or binder material with minimal skill or effort from the operator.

It is the objective of the invention to provide a new and improved **linear building block forming apparatus** that will compress the soil under high pressure to produce a building block so dense when ejected from the multiple function case that it will be instantly ready for use and need not be cured before use.

It is a further object of the invention to provide a new and improved **linear building block forming apparatus** that is modular in nature to allow for the addition of one or more multiple function cases, which may be controlled simultaneously or independently.

It is therefore also an object of the invention to provide a new and improved **linear building block forming apparatus** that is modular in nature to allow for higher production yields or to allow for production of blocks of different dimensions simultaneously or independently.

It is also an objective of the invention to provide a new and improved **linear building block forming apparatus** that produces uniform blocks dimensionally of adjustable sizes, which can be used to construct a structure by progressively dampening the upper course of the structure with water or light mud slurry, and placing the next course directly on top of this course .

It is still another object of the invention to provide a new and improved **linear building block forming apparatus** that is of durable construction.

It is also another object of the invention to provide a new and improved **linear building block forming apparatus** that requires low maintenance and is easily serviced.

It is yet another object of the invention to provide a new and improved **linear building block forming apparatus** that can be assembled and operated with a minimal of skill and attention.

It is still a further object of this invention to provide a new and improved **linear building block forming apparatus** that loads soil into the soil receiving area of the multiple function case efficiently and in a more compacted state by the use of a high-frequency vibration apparatus mounted directly to the soil receiving hopper. These and other

advantages, features and objects of the invention will become more apparent from the following description taken in connection with the illustrative embodiment in the accompanying drawings.

Brief Description of the Drawings

FIG. 1 is a side lateral view of a four wheel mounted trailer form of the instant invention; FIG. 2 is a top view of the invention mounted atop a four wheeled trailer chassis in which the soil hopper and a pair of hydraulic actuators have been fragmented to illustrate the multiple function case;

FIG. 3 is a partially fragmented top view of the multiple function case in which the compression heads and hydraulic actuators are more clearly illustrated;

FIG. 4 is a partially fragmented rear view of the invention mounted atop a four wheeled trailer chassis;

FIG. 5 is a rear lateral view of the invention showing a pair of multiple function cases, in which one contains a positioning control apparatus, which have been joined together about their corresponding connecting panels;

FIG. 6 is a sectional view taken about line 6 – 6 in FIG. 3 showing the locations and positions of the soil hopper, adjustable compression heads and their components, multiple function case and its components, and loose soil prior to compaction;

FIG. 7 is a partially fragmented side lateral view of the multiple function case showing the movement and positions of the compression heads, multiple function case and its components, compressed soil block and loose soil at compaction;

FIG. 8 is a partially fragmented side lateral view of the multiple function case showing the movement and positions of the compression heads, multiple function case and its components, compressed soil block and loose soil at the moment the compressed soil block is ejected from the multiple function case; FIG. 9 is a fragmentary diagrammatic view illustrating the manner in which the hydraulic actuators may be controlled for the purpose of achieving desired compression between compression heads, and

FIG. 10 is a rear lateral view of the invention showing a plurality of multiple function cases, in which one contains a positioning control apparatus, which have been joined together about their corresponding connecting panels.

Description of the Preferred Embodiment

Referring now more specifically to the drawings, the numeral 15 generally designates a trailer frame which may be towed behind a towing vehicle (not shown) and which includes a pair of wheeled axle assemblies 21 and 22 on its rear end as well as a jack structure 16. The jack structure 16 may be utilized (in order) to (stationarily) support the trailer frame 15 from the ground 23. "Amended "

The trailer frame 15 supports a case support frame 33, a hydraulic tank 29, a programmable logic control (PLC) unit 95, a control panel 97, a hydraulic pump 99, an electrical motor 101, a pair of roller conveyors 35, as well as a hopper support frame 19. As seen in FIGS. 1 and 4, the hopper support frame 19 contains the soil hopper 17 positioned above the pair of multiple function cases 27 and 28, in a stationary position. Said soil hopper 17 is supported by a pair of braces 43 about its discharge area.

The case support frame 33 supports a pair of multiple function cases 27 and 28, each with a pair of hydraulic actuators 25 attachable at a point generally referred to by the numeral 37 as seen in FIGS. 2 and 4.

The multiple function cases 27 and 28 are representative of a possible combination whereby both cases will function in unison to create compressed soil blocks uniform in size, thickness, and density (See FIG. 3). As illustrated in FIG. 5, the multiple function cases 27 and 28 are symmetrical about their connecting panels 44.

As is illustrated in FIGS. 3, 5 and 6, the multiple function cases, 27 and 28, are composed of compression heads, generally designated by numerals 46 and 47, side cover panels 45, connecting panels 44, upper covers 41 and 42 and lower covers 38 and 40. As can be seen in the previously mentioned FIGS., the upper covers 41 and 42, along with bottom covers 38 and 40 and panels 44 and 45 are joined to form an enclosed area. Said enclosed area contains two apertures designated by numerals 48 and 80. It is within said enclosed area that a compression case area, generally designated by numeral 60 is formed. Within said compression case area 60 compression case wear plates 61, 63, 65 and 67 are mounted securely. Said wear plates are to be constructed of a hardened steel alloy capable of withstanding high abrasion.

As illustrated in FIGS. 3 and 6, the compression heads 46 and 47 are comprised of compression head frames 73 and 77. Compression head wear plates 57, 59, 69 and 71 are

securely mounted to said compression head frames as illustrated. Said wear plates are to be constructed of a hardened steel alloy capable of withstanding high abrasion.

The compression heads 46 and 47 are introduced within the compression case area 60 at opposite ends of said compression case and are secured by rear compression head plates 75 and 79 as seen in FIG. 6. As can be seen in FIG. 3, the rear compression head plates 75 and 79 are then attached to the hydraulic actuators 25 and 26 by means of actuator rods 31 and 32 at connection points generally designated by numerals 36 and 37, respectively.

In reference to FIGS. 1, 3 and 6, as soil 51 is loaded into the soil hopper 17 by manual or mechanical means. At commencement of the "first stage" of operation, a high-frequency vibration apparatus 39 increases the force by which loose soil 51 passes downwardly through said soil hopper 17 and into an adjustable soil receiving area 49. The downward force of the soil, aided by gravity and said vibration apparatus will uniformly fill and compact soil in said receiving area. At a preset interval of time the first stage of operation terminates as the PLC system 95 will disengage the high-frequency vibration apparatus 39.

As can be seen in FIG. 3, during the initial process, anterior hydraulic actuators 25 will be in fully retracted positions, while posterior hydraulic actuators 26 will be fully extended. Said actuators are coupled to anterior 46 and posterior 47 compression heads at connection points generally designated by numeral 37. The positions of said actuators and respectively, said compression heads hereby aid in forming a soil receiving area 49, which is adjustable in accordance to the positions of said compression heads within the compression case area 60. In reference to FIG. 7, as the "second stage" of operation begins, both anterior and posterior hydraulic actuators (not shown) engage the anterior compression head 46 and posterior compression head 47. Said compression heads travel to preset destinations as shown in FIG. 7. As is illustrated in FIG. 7, the posterior compression head 47 will stop and remain stationary, as the anterior compression head 46 remains engaged. Thus, the "third stage" of operation begins. As the anterior compression head 46 travels within the compression case area 60 towards the posterior compression head 47 the soil 51 between said compression heads will become compacted further, until a block of compacted soil 10 is formed between said heads.

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In reference to FIGS. 7 and 9, the compression of the soil 51 between said compression heads will create a rise in hydraulic pressure in hydraulic line 118. When an initial preset pressure is reached in said hydraulic line, an adjustable pressure switch 103 will engage, and the PLC unit 95 will actively engage valve assembly 106 to increase pressure in hydraulic line 112. Hence, the posterior hydraulic actuator (not shown) will be engaged along with the posterior compression head 47 to travel towards the anterior compression head 46. The dual compression of said compressed soil block will continue to elevate hydraulic pressure within hydraulic lines 112 and 118. Upon reaching an optimal preset compression pressure in said hydraulic lines the adjustable pressure switch 104 will engage, and the PLC unit 95 will actively engage valve assembly 106 to disengage pressure in hydraulic line 112, thus diverting the hydraulic pressure to hydraulic line 120. As illustrated on FIG. 8, whereas a compressed soil block 10 has been successfully formed within the compression case area 60 by utilizing opposing compression heads 46 and 47, the "fourth stage" of operation commences. As the posterior hydraulic actuator (not shown) retracts, the posterior compression head 47 is withdrawn to the position illustrated in FIG. 8. As the anterior hydraulic actuator (not shown) continues through the compression case area 60, the anterior compression head forces the compressed soil block 10 into the block discharge area 80. Subsequent to the completion of a full operation, the discharged compressed soil block 10 will exit the invention. Fig. 8 generally illustrates the completion of the "fourth stage" of operation, and more specifically, the general locations of compression heads 46 and 47. Whereas the "fourth stage" is completed, the hydraulic actuators 25 and 26 will return to their original 'base' positions. The PLC unit 95 will then re-engage the high-frequency vibrating apparatus 39.

With attention now invited more specifically to FIG. 9, it may be seen that the hydraulic actuators 25 and 26 are serially connected within a hydraulic circuit 108 including a pump 99 for pumping hydraulic fluid from a reservoir 29, to the actuators 25 and 26 and then back to the reservoir 29. The hydraulic circuit 108 includes valve assemblies 105 and 106 serially connected therein and the valve assemblies 105 and 106 are under the control of a pair of solenoids 107 and 109 actuated by output conductors 148, 150, 152, 154, 156, 158, 160 and 162, from a PLC unit 95. A plurality of proximity switches 90, 1,

he underlying inventive concept and that the same is not limited to the particular forms herein shown and described except insofar as indicated by the scope of the appended claims.

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